L 10236-66 EWT(1)/EWT(m)/T/EWP(t)/EWP(b)/EWA(m)-2 IJP(c)

ACC NR: AP6000192 SOURCE CODE: UR/0056/65/049/005/1402/1407

AUTHOR: Pilipenko, D. V.; Gusev, V. A.; Fogel', Ya. M.

ORG: Physicotechnical Institute, Academy of Sciences, Ukrainian SSR (Fiziko-tekhnicheskiy institut Akademii nauk Ukrainskoy SSR)

TITLE: Electron loss and formation of slow negative ions in collisions of hydrogen atoms and H^- ions with gas molecules

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 49, no. 5, 1965, 1402-1407

TOPIC TAGS: ionization, electron loss, charge exchange, collision cross section

ABSTRACT: This is a continuation of earlier work by the authors (ZhETF v. 48, 404; 1965) dealing with charge exchange occurring during collisions between atoms and gas molecules. The present paper is devoted to a measurement of the effective cross section σ_{-10} for the loss of an electron by negative ions of hydrogen with energy from 3 to 30 kev by collision with O_2, NO, and CO. The apparatus was described in detail in the earlier paper. The authors measured also the cross sections σ_i for the formation of slow negative ions by collison of H and H^- with the same molecules in the same energy range. The plot of σ_{-10} vs. the fast-particle energy ϵ for the H-CO pair has a structure which can be explained with the aid of the adiabatic Massey criterion. The magnitude of the cross section and the form of its energy depend on the nature of the target gas and on the binding energy of the electron in the fast particle. The cross section is largest for O_2, smallest for CO, and intermediate for

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ACC NR: AP6000192

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NO. It is concluded from the fact that the energy dependence for the H^- ions is the same for all the investigated gases that the maximum of σ_1^- occurs at low energies. At the maximum, σ_1^- is much larger for H^- than for H. With increasing particle energy, the cross sections for H^- and H come closer together and become approximately equal for O_2 and NO. The peaks on the $\sigma_1^-(\epsilon)$ curve correspond to the adiabatic Massey criterion. Authors thank Professor A. K. Val'ter for continuous interest in the work. [02]

Orig. art. has: 4 figures and 3 formulas. 44,55

SUB CODE: 20/ SUBM DATE: 20Jun65/ ORIG REF: 009/ OTH REF: 001/

ATD PRESS: 4163

Card 2/2

GUSEV, V.A.

Epilepsy and pregnancy. Vrach.delo supplement '57:82-83 (MIRA 11:3)

1. Klinika nervnykh bolezney Gor'kovskogo meditsinskogo instituta na baze Gor'kovskoy oblastnoy klinicheskoy bol'nitsy.
(EPILEPSY) (PREGNANCY, COMPLICATIONS OF)

GUSEV, V.A.

Epilepsy and pregnancy. Vop.diag.i patomorf.nerv.zab. no.2:158-162 '59. (MIRA 15:8)

(EPILEPSY) (PREGNANCY, COMPLICATIONS OF)

GUSEV, V.A.

Myasthenic syndrome in acute encephalitis. Vrach.delo no.9:983-984 S '59. (MIRA 13:2)

1. Klinika nervnykh bolezney (zaveduyushchiy - prof. F.A. Poyemnyy) Gor'kovskogo meditsinskogo instituta i klinika akushertva i ginekologii (zaveduyushchiy - prof. G.K. Cherepakhin) Gor'kovskogo gorzdravotdela.

(MYASTHENIA GRAVIS) (ENCEPHALITIS)

GUSEV, V.A.

Multiple sclerosis and pregnancy. Sbor. nauch. rab. Kaf. akush. i gin. GMI no.1:42-43 '60. (MIRA 15:4)

1. Iz kliniki nervnykh bolezney (direktor prof.Poyemnyy, F.A.) i kliniki akusherstva i ginekologii (direktor prof. Cherepakhin, G K.) Gor'kovskogo gosudarstvennogo meditsinskogo instituta.
(MULTIPLE SCLEROSIS) (PREGNANCY, COMPLICATIONS OF)

GUSEV, V.A.

Two cases of acute encephalitis in pregnant women. Sbor. nauch. rab. Kaf. akush. i gin. GMI no.1:44-49 '60. (MIRA 15:4)

1. Iz kliniki akusherstva i ginekologii (direktor prof.Cherepakhin, G.K.) i kliniki nervnykh bolezney (direktor prof.Poyemnyy, F.A.) Gor'kovskogo gosudarstvennogo meditsinskogo instituta.
(ENCEPHALITIS) (PREGNANCY, COMPLICATIONS OF)

GUSEV, V.A.

Spinal cord tumor and pregnancy. Sbor. nauch. rab. Kaf. akush. i gin. GMI no.1:50-52 '60. (MIRA 15:4)

1. Iz kliniki nervnykh bolezney (direktor prof.Poyemnyy, F.A.) i kliniki akusherstva i ginekologii (direktor prof.Cherepakhin) Gor'kovskogo gosudarstvennogo meditsinskogo instituta.
(SPINAL CORD--TUMORS)
(PREGNANCY, COMPLICATIONS OF)

GUSEV, V.A.

Epilepsy first appearing during pregnancy. Sbor. nauch. rab. Kaf. akush. i gin. GMI no.1:53-55 '60. (MIRA 15:4)

1. Iz kliniki akusherstva i ginekologii (direktor prof. Cherepakhin, G.K.) i kliniki nervnykh bolezney (direktor prof.Poyemnyy, F.A.) Gor'kovskogo gosudarstvennogo meditsinskogo instituta.
(EPILEPSY) (PREGNANCY, COMPLICATIONS OF)

GUSEV, V.A.

Epilepsy and pregnancy. Sbor. nauch. rab. Kaf. akush. i gin. GMI no.1:56-58 '60. (MIRA 15:4)

1. Iz kliniki nervnykh bolezney (direktor prof. Poyemnyy, F.A.) i kliniki akusherstva i ginekologii (direktor prof. Cherepakhin, G.K.) Gor'kovskogo meditsinskogo instituta.
(EPILEPSY) (PREGNANCY, COMPLICATIONS OF)

GUSEV, V.A.; SEMENOVA, P.Ya.

Course of Landry's paralysis in pregnant women. Sbor. nauch. rab. Kaf. a ush. i gin. GMI no.2:69-71 '60. (MIRA 15:4)

1. Iz nevrologicheskogo otdeleniya bol'nitsy No.4 Gcr'kovskogo gorodskogo zdravootdela (glavnyy vrach Babushnikova, Ye.V.).
(PREGNANCY, COMPLICATIONS OF) (PARALYSIS)

GUSEV, V.A.

Treatment of tuberculous meningitis in pregnant women. Sbor. nauch. rab. Kaf. akush. i gin. GMI no.2:72-74 '60. (MIRA 15:4)
(MENINGES--TUBERCULOSIS) (PREGNANCY, COMPLICATIONS OF)

GUSEV, V.A.; MOSHNINA, M.A.; TROSHIN, V.D.

Thrombosis in the sinuses of the brain appearing in the puerperium.
Sbor. nauch. rab. Kaf. akush. i gin. GMI no.2:75-77 '60. (MIRA 15:4)

1. Iz Gor'kovskoy oblastnoy bol'nitsy No.2 (glavnyy vrach Mal'tsev, Ye.I.).
(THROMBOSIS) (PUERPERIUM) (BRAIN--DISEASES)

GUSEV, V.A.

Status epilepticus in pregnancy. Akush. i gin. 36 no.2:67-68 Mr-Ap '60. (MIRA 13:12)

(EPILEPSY) (PREGNANCY, COMPLICATIONS OF)

GUSEV, V.A.

Managing pregnancy in patients with epileptic attacks. Vop. okh. mat. i det. 6 no.11:57-61 N '61. (MIRA 14:12)

1. Iz kliniki akusherstva i ginekologii (dir. - zasluzhennyy deyatel' nauki prof. G.K.Cherepakhin) kliniki nervnykh bolezney (dir. - prof. F.A.Poyemnyy) Gor'kovskogo meditsinskogo instituta imeni S.M.Kirova i Gor'kovskoy oblastnoy klinicheskoy bol'nitsy imeni N.A.Semashko (glavnyy vrach - zasluzhennyy vrach RSFSR K.I.Kuznetsov).
(EPILEPSY) (PREGNANCY, COMPLICATIONS OF)

GUSEV, V.A.; SEMENOVA, P.Ya.

Course of Landry's paralysis during pregnancy and after labor.
Akush.i gin. 37 no.1:95-96 '61. (MIRA 14:6)

1. Iz nervnogo otdeleniya bol'nitsy No.4 (glavnyy vrach Ye.V. Babushnikova), Gor'kiy.
(PREGNANCY, COMPLICATIONS OF) (PUERPERIUM)
(PARALYSIS)

GUSEV, V.A.

Treatment of tuberculous meningitis in pregnancy. Akush.i gin. no.4:59-63 '61. (MIRA 15:5)

1. Iz kliniki nervnykh bolezney (dir. - prof. F.A. Poyemnyy) i kliniki akusherstva i ginekologii (dir. - prof. G.K. Cherepakhin) Gorkovskogo meditsinskogo instituta imeni S.M. Kirova.
(MENINGES--TUBERCULOSIS) (PREGNANCY, COMPLICATIONS OF)

GUSEV, V.A. (Ivanovo)

Quaternion monogenic functions according to G.S.Moisil and V.S.Fedorov. Bull math Rum 6 no.1/2:87-96 '62 [publ. '64].

1. Submitted March 12, 1963.

GUSEV, V.A. (Gor'kiy)

Se' ures of the petit mal type and pregnancy. Kaz. med. zhur. 4:63 Jl-Ag'63 (MIRA 17:2)

GUSEV, V.A.

Epilepsy in pregnancy. Akush. i gin. 39 no.3:96-98 My-Je'63
(MIRA 17:2)

1. Iz kliniki nervnykh bolezney (direktor - prof. F.A. Poyemnyy) i kliniki akusherstva i ginekologii (direktor- zasluzhennyy deyatel' nauki RSFSR prof. G.K. Cherepakhin) Gor'kovskogo meditsinskogo instituta imeni S.M.Kirova.

GUSEV, V.A.

Treatment of meningeal tuberculosis in pregnant women. Probl. tub. 41 no.9:48-51 '63 (MIRA 17:4)

1. Iz kliniki akusherstva i ginekologii (dir. - prof. G.K. Cherepakhin) i kliniki nervnykh bolezney (dir. - dotsent Ye. P. Semenova) Gor'kovskogo meditsinskogo instituta imeni S.M. Kirova) i Gor'kovskoy oblastnoy klinicheskoy bol'nitsy imeni N.A. Semashko.

GUSEV, V.A., kand. med. nauk

Acute disorders of cerebral circulation in pregnancy and puerperium. Sov. med. 27 no.6:62-67 Je '64. (MIRA 18:1)

1. Klinika nervnykh bolezney (zav. - dotsent Ye.P. Semerova) i klinika akusherstva i ginekologii (zav. - prof. G.K. Cherepakhin) lechebnogo fakul'teta Gor'kovskogo meditsinskogo instituta imeni S.M. Kirova.

[illegible], [illegible] ([illegible]anovo)

Generalized [illegible] derivatives and Taylor's series. Izv. vys. ucheb. zav.; mat. no.5:41-45 '64. (MIRA 18:3)

GUSEV, V.A.

Myopathy originating during pregnancy. Zhur. nevr. i psikh. 64 no.6:816-818 '64. (MIRA 17:12)

1. Klinika nervnykh bolezney i klinika akusherstva i ginekologii Gor'kovskogo meditsinskogo instituta im. S.M. Kirova i Gor'kovskogo oblastnaya klinicheskaya bol'nitsa im. N.A. Semashko.

GUSEV, V.A.

An analog of the Cauchy integral for monogenic functions. Izv. AN Arm. SSR. Ser. fiz.-mat. nauk 18 no.3:15-22 '65. (MIRA 18:8)

1. Ivanovskiy energeticheskiy institut im. V.I.Lenina.

VERBA, M.I., kand. tekhn. nauk, dotsent; GUSEV, V.A.

Averaging of the temperature of a decomposing material in a reactor with a fluidized bed. Izv. vys. ucheb. zav.; energ. 8 no.6:54-62 Je '65. (MIRA 18:7)

1. Moskovskiy ordena Lenina energeticheskiy institut. Predstavlena kafedroy sushil'nykh i teploobmennykh ustroystv.

PILIPENKO, D.V.; GUSEV, V.A.; FOGEL', Ya.M.

Electron loss and formation of slow negative ions in collisions of H atoms and H_2^- ions with gas molecules. Zhur.eksp. i teor. fiz. 49 no.5:1402-1407 N '65. (MIRA 19:1)

1. Fiziko-tekhnicheskiy institut AN UkrSSR.

ACC NR: AP6036048 SOURCE CODE: UR/0056/66/051/004/1007/1010

AUTHOR: Gusev, V. A.; Pilipenko, D. V.; Fogel', Ya. M.

ORG: Physicotechnical Institute, AN UkrSSR (Fiziko-tekhnicheskiy institut, AN UkrSSR)

TITLE: Slow ion formation with the passage of fast protons and hydrogen atoms through nitrous oxide

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 51, no. 4, 1966, 1007-1010

TOPIC TAGS: ion, negative ion, ion exchange, mass spectrum, proton

ABSTRACT: An investigation is made of the mass spectra of slow positive ions produced as a result of dissociative ionization of N_2O molecules by fast protons or hydrogen atoms and also of the mass spectra of slow negative ions produced as a result of charge exchange between the hydrogen atom and an N_2O molecule. The relative intensities of the slow ion beams are compared with the bond breaking energies of N_2O. The authors express their gratitude to G. N. Polyakova for

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ACC NR: AP6036048

investigating the N_2O luminescence spectrum produced by the proton impact. Orig. art. has: 4 formulas and 1 figure. [Authors' abstract] [AM]

SUB CODE: 20/SUBM DATE: 16Apr66/ORIG REF: 006/OTH REF: 009/

Card 2/2

GUSEV, Vladimir Alekseyevich; GORLOV, Georgiy Dmitriyevich; LANDO, Anatoliy Isaakovich; TELEPNEV, V.P., red.

[General contractor of the city of Kiev] General'nyi podriadchik Kieva. Kiev, Budivel'nyk, 1965. 122 p. (MIRA 18:8)

1. Glavnoye upravleniye po zhilishchnomu i grazhdanskomu stroitel'stvu g. Kiyeva (for Gusev, Gorlov, Lando).

APPROVED FOR RELEASE: 09/19/2001 CIA-RDP86-00513R000617610002-8"

GUSEV, Vladimir Alekseyevich; POKRASS, Leonid Iosifovich;
CHUDNOVSKIY, Abram Mironovich; MOSKALENKO, I.Ye., red.

[Improve the quality of construction work] Sovershen-
stvovat' kachestvo stroitel'nykh rabot. Kiev, Budivel'-
nyk, 1965. 85 p. (MIRA 18:12)

GUSEV, V. D.

PA 8T112

USSR/Ionosphere Feb 1947
Heaviside layer

"The Reasons for the Change in Amplitude of a Single Impulse Reflected from the Ionosphere," V. D. Gusev, 12 pp

"Izv Ak Nauk Fiz" Vol XI, No 2

Examination of problems pertaining to the inhomogeneous structure of the E-layer.

8T112

GUSEV, V. D., and MIRKOTAN, S. F.

"Investigation of the Fine Structure of the Ionosphere by the Method of Frequency-Spaced Reception," by V. D. Gusev and S. F. Mirkotan, Physics Faculty, Moscow State University, Radiotekhnika i Elektronika, No 6, Jun 56, pp 743-746

This article quotes the theoretical and experimental results of an investigation of the frequency distribution of the amplitude fading of a solitary signal reflected from the ionosphere.

Conclusions concerning the magnitude of the fine-scale heterogeneities of the ionosphere were made according to altitude.

Sum 1239

GUSEV, V.D.

9. V. D. GUSEV, L. A. DRACHEV: Phase method of recording large ionospheric inhomogeneities (Moscow Univ.) - Physics Faculty 747

Abstract: A method is proposed of recording ionospheric inhomogeneities in terms of the variations of the phase path of a signal reflected from the ionosphere.

The first measurement results of the variation of the phase path of a signal reflected from the F_2 -layer are cited.

RADIOTEKHNIKA I ELEKTRONIKA, Vol 1, Nr 6, 1956, p 747

GUSEV, V.D.; ARKHANGEL'SKIY, M.Ye.

Experimental investigation of the fine structure of the ionosphere. Vest.Mosk.un.Ser.mat.,mekh., astron., fiz.,khim. 12 no.2:75-83 '57. (MIRA 10:12)

1.Kafedra rasprostraneniya, izlucheniya i kanalizatsii elektromagnitnykh voln Moskovskogo universiteta.
(Ionosphere)

GUSEV, V.D.; VINOGRADOVA, M.B.; DRACHEV, L.A.; MIRKOTAN, S.F.

Study of the heterogenous of the structure of the ionosphere. Vest. Mosk.un. Ser.mat.mekh.astron. fiz. khim. 12 no.4:129-136 '57. (MIRA 11:5)

1.Kafedra rasprostraneniya, izlucheniya i kanalizatsii elektromagnitnykh voln Moskovskoge gosudarstvennogo universiteta.
(Ionosphere)

3(6), 3(7)

SOV/20-123-5-13/50

AUTHORS: Gusev, V. D., Drachev, L. A., Mirkotan, S. F., Berezin, Yu. V., ~~Kiyanovskiy~~, M. P., Vinogradova, M. B., Gaylit, T. A.

TITLE: The Structure and the Motions of Large-Scale Inhomogeneities in the Ionosphere Layer F_2 (Struktura i dvizheniya krupnykh neodnorodnostey v ionosfernom sloye F_2)

PERIODICAL: Doklady Akademii nauk SSSR, 1958, Vol 123, Nr 5, pp 817-820 (USSR)

ABSTRACT: The authors invented an integral phase method for the recording of great inhomogeneities and their motions. This method is free from the deficiencies of other methods and consists of the recording of the variations of the phase way of the reflected signal. For small inhomogeneities, these variations are of the order 2π, and for large-scale inhomogeneities - of the order $40 - 200\ \pi$. This method has a high precision (which amounts to dozens of meters) and a high resolving power. This permits the use of statistical methods in the investigation of large-scale inhomogeneities. The apparatus for the recording of phase variations consists

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The Structure and the Motions of Large-Scale Inhomogeneities in the Ionosphere Layer F_2 SOV/20-123-5-13/50

of receiving and transmitting ionosphere stations with phase indicators and photoindicators. The phase variations are recorded on a cinematographic film. The authors used 3 recording apparatus placed in 3 points of the Earth's surface, these points formed a triangle of 30 - 40 km side length. In each of these points the variations of the phase of the reflected signal were recorded. In this way, the authors found a regular smooth curve for $\varphi_p(t)$ on which random-character variations $\varphi(t)$ (which are due to the presence of inhomogeneities and their motions in the ionosphere) are superimposed. The term $\varphi_p(t)$ is due to the variation of the height distribution of the ionization of the ionospheric layers from day to night. A suitable utilization of the results permits a separation of φ_p and φ. (These 2 quantities are not exactly defined in this paper). An analysis of the behavior of $\varphi(t)$ gives data concerning the dimensions, the shape, and the motions of the inhomogeneities. The following parameters were found: The velocity V_d of the horizontal drive in the ionosphere and

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SOV/20-123-5-13/50

The Structure and the Motions of Large-Scale Inhomogeneities in the Ionosphere Layer F_2

its direction which is determined by the angle β; the average shape of the ionosphere inhomogeneities which is determined by the "characteristic ellipse"; the radius of correlation and the spatial dimensions of the inhomogeneities Δ; the time of spreading τ_c or the parameter of spreading δ of the inhomogeneities. By analysis of the variations of the phase and of the rate of phase variation the direction of the reflected radiowaves could be determined. The correlation functions were calculated by means of an electronic computer of the type "Strela". All the above-discussed results concern the layer F_2; they were found from May 1956 to October 1957. The large-scale inhomogeneities have a distinctly anisotropic shape; the dimensions depend on the direction. Numerical values are given for the dimensions of the inhomogeneities. The values of V_d are within the interval 0 - 40 km/min, and most frequently the values 8 - 10 km/min are found. The values of V_d increase only slightly from night to day. Because of

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The Structure and the Motions of Large-Scale Inhomogeneities in the Ionosphere Layer F_2

the presence of inhomogeneities in the ionosphere, the normal to the front of the reflected wave deviates from the vertical direction. For δ and τ_c the average values $\overline{\delta} \sim 0.3$ (day) and $\delta \sim 0.58$ (night) and $\overline{\tau_c}$ were found. There are 1 figure, 1 table, and 6 references, 2 of which are Soviet.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova (Moscow State University imeni M. V. Lomonosov)

PRESENTED: July 18, 1958, by N. N. Bogolyubov, Academician

SUBMITTED: July 17, 1958

Card 4/4

GUSEV, V. D.

В. Л. Гершман,
В. Н. [illegible]

О применении спектральной теории турбулентности к задачам рассеяния от неровностей поверхности моря при волнении

В. Е. Кинбер,
М. Ф. Бахарева,
Т. Г. [illegible]

Функция распределения уровня сигнала (медленные замирания)

10 июня
(с 10 до 16 часов)

Б. Н. Гершман,
В. П. Докучаев

К теории образования ионосферных неоднородностей в слое.

В. Д. Гусев,
Ю. В. Кушнеревский,
С. Ф. Миркотан

Сопоставление результатов наблюдения за крупными и мелкими неоднородностями в слое F_2

В. Д. Гусев,
С. Ф. Миркотан,

Ю. В. Березин,
М. П. Кияновский

О разрешающей способности систем, измеряющих горизонтальные размеры ионосферных неоднородностей.

В. Д. Гусев,
[illegible],
Т. А. Гайлит

Статистические свойства фазы волны, отраженной от ионосферы

В. Д. Гусев,
Т. А. Гайлит

Об автоматизации обработки экспериментальных данных при исследовании нерегулярной ионосферы

10 июня
(с 18 до 22 часов)

В. А. [illegible]

Расчет надежности связи [illegible] радиотрасс

Ю. Г. [illegible]

Графо-аналитический способ расчета линий радиосвязи для различных условий работы

report submitted for the Centennial Meeting of the Scientific Technological Society of Radio Engineering and Electrical Communications im. A. S. Popov (VNORiE), Moscow, 8-12 June. 1959

89772

S/169/61/000/002/026/039
A005/A001

9.9110 (also 1041, 1046)

Translation from: Referativnyy zhurnal, Geofizika, 1961, No. 2, p. 42, # 2G295

AUTHORS: Gusev, V. D., Mirkotan, S. F., Drachev, L. A., Berezin, Yu. V., ~~Kiyanovskiy, M. F.~~

TITLE: Results of the Investigation of the Parameters of Large-Scale Inhomogeneities of the Ionosphere by the Phase Method

PERIODICAL: V sb.: "Dreyfy i neodnorodnosti v ionosfere", No. 1, Moscow, AN SSSR, 1959, pp. 7-21 (English summary)

TEXT: The method of measuring and processing the materials of observations of the large-scale inhomogeneities in the F2-layer of the ionosphere is described in detail. The time variations of the phase of the pulse signal reflected by the F2-layer of the ionosphere were recorded by three spaced stations. The records are being processed by the correlation method with electronic computers. The following inhomogeneity parameters were determined: apparent drift speed V', characteristic speed V'_c, the speed of chaotic variations v_c, the actual drift speed v_d, the parameters of the so-called "characteristical" ellipse, which determine the anisotropy degree of inhomogeneities, their dimensions and time of

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S/169/61/000/002/026/039
A005/A001

Results of the Investigation of the Parameters of Large-Scale Inhomogeneities of the Ionosphere by the Phase Method

"broadening", and parameter V_c/V_d allowing the estimation of the part of the chaotic variations. The results are presented of investigations in the period from January 1957 to May 1958. It is shown that inhomogeneities in the horizontal direction are anisotropic; the direction of the larger dimension (the major axis of the characteristical ellipse) approximately coincides with the meridian; the average ratio of the major and minor dimensions (the eccentricity of the ellipse) is about 2; this value and the direction of the major axis are nearly independent of the time during 24 hours; the average value of the major axis is about 500 km by night and about 200 km by day. The values of drift speed of inhomogeneities mostly found are 8 - 10 km/min; the direction of drift is: in the evening and by night northward, by day and in the morning southward. The "broadening" of inhomogeneities proceeds more rapid by day than by night. The speed of chaotic variations V_c exceeds the drift speed on the average by 1.5 times. A comparison is carried out of the results obtained with the values formerly known. It is shown that the characteristics of the large-scale and small-scale inhomogeneities (anisotropy, drift, chaotic variations) agree with each other, which points out

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S/169/61/000/002/036/039
A005/A001

Results of the Investigation of the Parameters of Large-Scale Inhomogeneities of the Ionosphere by the Phase Method

the possibility of the connection and common origin of the processes controlling the formation and motion of all inhomogeneities in the ionosphere. There are 15 references.

E. Kazimirovskiy

Translator's note: This is the full translation of the original Russian abstract.

X

Card 3/3

67235

~~9(9)~~ 9.9100

AUTHOR: Gusev, V.D. SOV/55-59-1-12/28

TITLE: Determination of ν_{ef} in the Ionosphere

PERIODICAL: Vestnik Moskovskogo universiteta. Seriya matematiki, mekhaniki, astronomii, fiziki, khimii, 1959, Nr 1, pp 105-108 (USSR)

ABSTRACT: The author investigates the determination of the effective collision frequency ν_{ef} between the electrons and the neutral particles and ions on several levels of the ionosphere. Starting from the well-known formula

$$(1) \qquad K = \frac{1}{c} \int_0^{z_{refl.}} \nu_{ef} \frac{1-n^2}{n} dz,$$

where $n^2 = 1 - \frac{4\pi e^2 N(z)}{m\omega^2}$, the author solves the problem for an isotropic medium for a monotone dependence of the properties of the ionosphere on the height by reducing (1) to an Abelian equation which can be solved with the aid of Laplace transformations.

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67235

Determination of ν_{ef} in the Ionosphere SOV/55-59-1-12/23

For a multilayer ionosphere the result has to be applied repeatedly and yields a first approximation of the sought ν_{ef}-value

There are 2 Soviet references.

ASSOCIATION: Kafedra rasprostraneniya, izlucheniya i kanalizatsii radiovoln (Chair of Propagation, Radiation and Channelling of Radio Waves)

SUBMITTED: June 25, 1958

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SOV/109-4-1-2/30

AUTHOR: Gusev, ~~V. D.~~

TITLE: Some Problems Relating to the Radio Wave Scattering in the Ionosphere (Nekotoryye voprosy rasseyaniya radiovoln v ionosfere)

PERIODICAL: Radiotekhnika i elektronika, 1959, Vol 4, Nr 1, pp 12-16 (USSR)

ABSTRACT: The experimental investigations of the ionosphere are usually carried out at the Earth's surface and the results thus obtained are interpreted by employing the statistical methods; the basic mathematical tool in this interpretation is the correlation function. It is therefore of interest to investigate how correlation functions of the waves scattered by the ionosphere change under various conditions. For this purpose it is possible to assume (Ref.4 and 5) that the scattered field at a distance z is given by:

$$E(x) = \frac{1}{\lambda} \int_{-\infty}^{\infty} E_0(u)\, du \int_{-\infty}^{\infty} e^{ikz\sqrt{1-s^2}+ik(u-x)s}\, ds\,, \qquad (1)$$

where E_0 is the field at the plane $z = 0$. On the other hand the correlation function can be written in the form of

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Some Problems Relating to the Radio Wave Scattering in the Ionosphere

Eq.(2). This can also be represented in terms of the energy spectrum F(S). If the correlation function is in the form of the normal distribution, such as expressed by Eq.(3), it can be shown that for all ka and for $(2\ kz)^2 \gg 1$ the correlation function can be written as Eq.(4). The effect of the spread of the wave front on the form of the correlation function can be taken into account by assuming that the reflected field of the ionosphere can be written in the form of Eq.(6) where ε is the permittivity of the ionosphere, f(P) is a function which takes into account the directivity of the radiating antenna and ϕ is a certain operational functional. Normally, this reflected field can be written as a product of f(P) and a statistically homogeneous scattered field $E_0(x)$. Under these conditions the field at a distance z_0 from the scattering layer of the ionosphere can be expressed by Eq.(7), where z_1 is the distance from the source of the scattering region. The correlation function can therefore be written as :

$$\rho(\xi) = \rho_0\left(\frac{z_1}{z_1 + z_2}\xi\right)$$

which is true provided the inequalities expressed by formulae (8) are fulfilled. From the above it follows that the scattered field at any distance from the ionosphere is statistically non-homogeneous and that the correlation radius of the scattered field is a linear function of the distance only in the vicinity of the radiator. The time changes of the scattered field can be taken into account by assuming the presence of movements and various changes in the ionosphere. The motion of the ionosphere can be represented by assuming that the coordinates of the scattered field are as expressed by Eqs.(9), where v_x and v_z are random quantities independent of the field distribution in space. The random motion in the ionosphere obeys the normal distribution law, as represented by Eq.(10), where v_0 is the average square velocity of the random motion, while $v_{\mu x}$ and $v_{\mu z}$ are the averages of v_x

SOV/109-4-1-2/30

Some Problems Relating to the Radio Wave Scattering in the Ionosphere

and v_z , respectively. Consequently, on the basis of Eqs.(1), (2), (7) and (10), the correlation function for the case of $\bar{E} = 0$ is expressed by $\rho(\xi, \tau)$ (see p 15). In a general case, when it is necessary to take into account various time changes of the scattered field, the correlation function can be written in the form of Eq.(11). The paper contains 6 references, 4 of which are Soviet and 2 English.

SUBMITTED: July 5, 1956, and after revision, June 28, 1958.

Card 4/4

GUSEV, V.D.

Determination of the effective frequency of collisions in the ionosphere. Vest.Mosk.un.Ser.mat., mekh., astron., fiz., khim. 14 no.1:105-108 '59. (MIRA 13:8)

1. Kafedra rasprostraneniya, izlucheniya i kanalizatsii radiovoln Moskovskogo universiteta.
(Ionosphere) (Collisions (Nuclear physics))

9.9100

69005
S/055/59/000/04/011/026
B014/B005

AUTHORS: Gusev, V. D., Mirkotan, S. F., Berezin, Yu. V., Kiyanovskiy, M. P.

TITLE: On the "Resolving Power" of Systems for the Measurement of Dimensions of Ionospheric Inhomogeneities

PERIODICAL: Vestnik Moskovskogo universiteta. Seriya matematiki, mekhaniki, astronomii, fiziki, khimii, 1959, Nr 4, pp 105-115 (USSR)

ABSTRACT: Ionospheric inhomogeneities and motion may be studied by observing the reflection of radio signals by the ionosphere. At a given distribution of the three observation points on the earth's surface, the amounts of inhomogeneities determined by this system show an upper and a lower limit. The present paper deals with the definition of these limits and the estimate of error of the measurement results. The authors describe the apparatus by which the phase shifts of the reflected signal were measured. Figure 1 shows a block diagram of this measuring apparatus. Figure 2 shows the position of the measuring triangle. Details of the measuring method are given. Further, the authors develop formulas for determining the horizontal extension of ionospheric inhomogeneities from the measurement values, and for estimating the error. The investigation shows that the following limits hold for the extension Δ of measurable inhomogeneities at a given right observation triangle

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69005

On the "Resolving Power" of Systems for the Measurement of Dimensions of Ionospheric Inhomogeneities S/055/59/000/04/011/026 B014/B005

with the altitude S_o: $2.8S_o \leq \Delta \leq 46S_o$. In a similar way, the following limits hold for the distance S of two observation points: $2.8S \leq \Delta \leq 23S$. There are 7 figures, 1 table, and 10 references, 7 of which are Soviet.

ASSOCIATION: Kafedra rasprostraneniya radiovoln (Chair of Propagation of Radio Waves)

SUBMITTED: March 18, 1959

Card 2/2

S/055/59/000/06/08/027
B006/B005

AUTHOR: Gusev, V. D.

TITLE: Method of Correlation for Investigating Large Inhomogeneities of the Ionosphere

PERIODICAL: Vestnik Moskovskogo universiteta. Seriya matematiki, mekhaniki, astronomii, fiziki, khimii, 1959, No. 6, pp. 87 - 98

TEXT: A thorough investigation of the motion and parameters of large ionospheric inhomogeneities by the phase method is carried out at the kafedra rasprostraneniya, izlucheniya i kanalizatsii radiovoln fizicheskogo fakul'teta MGU (Chair of Propagation, Emission, and Channeling of Radio Waves of the Physics Department of Moscow State University). Correlation analysis proved to be most convenient. A detailed technique according to this method was developed to evaluate experimental data, and is described in the present paper. To apply this method, it is necessary to have observational data on the variation with time of the phases of reflected waves in three points at different places. Preliminary results on various parameters of large ionospheric inhomogeneities have already been published (Ref. 6). An analysis of experimental data showed

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that, within the error limits, the theoretical assumptions on which the determination of parameters is based are sufficiently accurate. A comparison of the parameters obtained by the phase method and by the method based on measurements of angles shows good agreement. All results obtained here can be used without restriction for a correlation analysis in investigations of small inhomogeneities by the amplitude method, and medium-sized inhomogeneities by the radioastronomical method if the angles of incidence of radio waves deviate only little from the perpendicular. There are 9 references, 6 of which are Soviet.

ASSOCIATION: Kafedra rasprostraneniya radiovoln (Chair of Propagation of Radio Waves)

SUBMITTED: February 25, 1959

6 9783

S/055/59/000/06/09/027
B006/B005

9.9100

AUTHORS: Gusev, V. D., Vinogradova, M. B.

TITLE: Some Fundamentals for the Experimental Determination of the Law of Propagation of a Continuous Random Function

PERIODICAL: Vestnik Moskovskogo universiteta. Seriya matematiki, mekhaniki, astronomii, fiziki, khimii, 1959, No. 6, pp. 99 - 105

TEXT: The knowledge of this law of propagation is necessary, for instance, if ionospheric inhomogeneities are to be investigated the statistical properties of which may be assumed to be steady. The present paper analyzes the possibility of determining the laws of propagation of steady random processes if the process was recorded within a limited period of time. It may be shown that the accuracy with which the probability density can be determined depends on the ratio of the registration interval to the correlation radius of the steady random function. The restriction to be imposed on the extent of interval in the case where the function is unsteady is also indicated. Estimations of the ratio between the correlation radius with respect to time and the registration interval, and of the restriction to be imposed on an interval increase by an unsteadiness of

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69783

Some Fundamentals for the Experimental Determination of the Law of Propagation of a Continuous Random Function

S/055/59/000/06/09/027
B006/B005

the random function, were carried out for random processes with a normal law of propagation, and also for a special form of the correlation function. The methods of estimating the accuracy of the correlation propagation laws may be also used for other special processes. The other form of the correlation function may lead to an inconsiderable change in quantitative relations. An analysis of the statistical properties of a signal phase reflected by the ionosphere shows that it is possible to use the method developed by the authors for investigating the statistical properties of unsteady random processes with indistinct unsteadiness. The results of this investigation may be also applied to investigations of statistical properties of functions representing the sum of steady random processes if their correlation radii considerably differ from each other. There are 2 Soviet references.

ASSOCIATION: Kafedra rasprostraneniya radiovoln (Chair of Propagation of Radio Waves)

SUBMITTED: March 17, 1959

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GUSEV, V.D.; MIRKOTAN, S.F.

Investigating motions (winds) in the F2 layer by the phase method taking into consideration anisotropy of the form and variability of inhomogeneities. Mezhdunar.geofiz.god no.7:70-73 '59. (MIRA 13:2)
(Ionospheric research)

GUSEV, V.D.

PHASE I BOOK EXPLOITATION SOV/5135

Nauchno-tekhnicheskoye obshchestvo radiotekhniki i elektrosvyazi im. A.S. Popova

100 let so dnya rozhdeniya A.S. Popova; yubileynaya sessiya (One Hundredth Anniversary of the Birth of A.S. Popov; Anniversary Session) [Moscow] Izd-vo AN SSSR, 1960. 312 p. Errata slip inserted. 2,800 copies printed.

Sponsoring Agency: Akademiya SSSR.

Chief Ed.: A.L. Mints, Academician; Editorial Board: G.D. Burdun, A.R. Vol'pert, I. Ye. Gorom, L. I. Gutenmakher, I.I. Grodnev, N.D. Devyatkov, L.A. Zhekulin, S.I. Katayev, M.S. Neyman, V.I. Siforov and N.I. Chistyakov; Ed. of Publishing House: L.V. Gessen; Tech. Ed.: S.G. Markovich.

PURPOSE: This collection of reports is intended for scientists and technicians working in radio engineering and telecommunications.

COVERAGE: The reports included in this collection were submitted at the scientific meeting held in 1959 by the Nauchno-tekhnicheskoye obshchestvo radiotekhniki i elektrosvyazi im. A.S. Popova (Scientific and Technical Society of Radio

~~Card 1/7~~

Engineering and Telecommunication imeni A.S. Popov) in commemoration of the 100th anniversary of A.S. Popov's birth. Only 29 of the more than 300 reports submitted at the meeting are included. The remainder are published in the periodicals of the AS USSR, State Committees, the Ministry of Communications, and the Society imeni A.S. Popov. The book contains the reports read at plenary sessions by A.N. Shchukin, Academician, A.A. Pistol'kors, Corresponding Member, AS USSR, and E.I. Adirovich and L.I. Gutenmakher, Professors, as well as those selected as the most interesting given in the following sections by their respective chairmen: Theory of Information, Antenna Systems, Receiving Devices, Wire Communications, Television, Electronics, Radio Measurements, General Radio Engineering, Transmitting Devices, Radio Wave Propagation, Electron Microscopy, Radio Broadcasting, Electroacoustics and Sound Recording, Electronic Computer Engineering, and SHF Ferrite Devices. These chairmen were on the Editorial Board which prepared the papers for publication. References accompany most of the reports.

One Hundredth Anniversary (Cont.) SOV/5135

~~Card 5/7~~

83429

S/188/60/000/001/003/010
B019/B056

9,9100

AUTHORS: Gusev, V. D., Gaylit, T. A.

TITLE: The Automation of Processing Experimental Data in Investigations of the Irregular Ionosphere 12

PERIODICAL: Vestnik Moskovskogo universiteta. Seriya 3, fizika, astronomiya, 1960, No. 1, pp. 39-47

TEXT: As shown by the authors' considerations in the first two parts of the present paper, the structure function of stochastic processes is better suited for the automatic evaluation of results of measurement than the correlation function. In the present paper, the authors investigated the electronic correloscope shown in Fig. 1 as a block diagram, which permits calculation of the structure function of a stochastic process having a spectrum of from 0 to 4 cps, without the necessity of previously recording this stochastic process on a film or a magnetic tape. This correloscope consists of a storage element (capacitor), a subtraction device, and a squaring device, an integrator, a direct-current amplifier, and an indicator tube. By means of this correloscope,

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The Automation of Processing Experimental Data in Investigations of the Irregular Ionosphere S/188/60/000/001/003/010 B019/B056

the structure function of the stochastic process is constructed from the amplitudes of the reflected signals. Fig. 2 shows the shapes of voltage at various points of the block diagram shown in Fig. 1, whereas Fig. 3 shows the circuit diagram of the subtraction and squaring devices. The correloscope is checked by means of a noise generator; satisfactory results were obtained. The circuit discussed is distinguished by a great simplicity of construction; it requires no special mechanical devices for tape conveyance, and makes it possible to investigate the time-dependent changes in the correlation characteristic of the reflected field. There are 6 figures and 5 references: 4 Soviet and 1 British.

ASSOCIATION: Kafedra rasprostraneniya radiovoln (Chair of Propagation of Radiowaves)

SUBMITTED: June 4, 1959

Card 2/2

69455

S/139/60/000/01/031/041
E192/E382

9,9100

AUTHORS: Gusev, V.D., Mirkotan, S.F., Kiyanovskiy, M.P. and Berezin, Yu.V.

TITLE: The Correlation Methods of Investigating (Ionospheric) Fluctuations in the Presence of a Slowly-changing Component

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, Fizika, 1960, Nr 1, pp 178 - 190 (USSR)

ABSTRACT: The phase of a signal reflected from the ionosphere can be represented as:

$$\Sigma(t) = \Phi(t) + \varphi(t) \quad (1)$$

where $\Phi(t)$ is the daily variation of the phase due to the changes of the ionisation in the ionospheric layers during day and night and $\varphi(t)$ is a random stationary function due to the presence of irregularities in the ionosphere and due to its motion. The function $\varphi(t)$ is of direct interest in the investigation of the ionosphere. However, it cannot be measured directly. It is therefore necessary to separate $\varphi(t)$ by some method. An attempt is made to devise such a procedure. Figure 1 shows a typical recording of the phase function

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E192/E382

The Correlation Methods of Investigating (Ionospheric) Fluctuations in the Presence of a Slowly-changing Component

$\Sigma(t)$ for a signal reflected from the ionosphere. It is seen that the recording contains slow but large variations which are represented by $\Phi(t)$. Comparatively rapid random changes $\varphi(t)$ having a period of approximately 15-30 min are superimposed on $\Phi(t)$. It is seen that the spread of $\Phi(t)$ is much greater than that of $\varphi(t)$. It is required to determine the function:

$$\rho_{ik}(\tau) = \frac{\overline{\varphi_i(t)\varphi_k(t+\tau)} - \overline{\varphi_i(t)}\cdot\overline{\varphi_k(t+\tau)}}{\sqrt{\left[\overline{\varphi_i^2(t)} - \overline{\varphi_i(t)}^2\right]\left[\overline{\varphi_k^2(t+\tau)} - \overline{\varphi_k(t+\tau)}^2\right]}} \qquad (2)$$

where the horizontal top lines denote statistical averaging for $i, k = 1, 2, 3$. Normally, the averaging can be done over a finite time interval and the function can be

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The Correlation Methods of Investigating (Ionospheric) Fluctuations in the Presence of a Slowly-changing Component

determined with an error $\delta\rho_T$ (Eq 2a). However, directly it is only possible to determine the correlation function expressed by:

$$\rho_{\Sigma_1\Sigma_{2\tau}}(\tau) = \rho_{\Sigma 12}(\tau) =$$

$$= \frac{\overline{(\Phi_1 + \varphi)(\Phi_{2\tau} + \varphi_{2\tau})} - \overline{(\Phi_1 + \varphi_1)}\;\overline{(\Phi_{2\tau} + \varphi_{2\tau})}}{\sqrt{\left[\overline{(\Phi_1 + \varphi_1)^2} - \overline{(\Phi_1 + \varphi_1)}^2\right]\left[\overline{(\Phi_{2\tau} + \varphi_{2\tau})^2} - \overline{(\Phi_{2\tau} + \varphi_{2\tau})}^2\right]}} \tag{3}$$

where $\varphi_1(t) = \varphi_1$, $\varphi_2(t + \tau) = \varphi_{2\tau}$ and so on $(i = 1,\ k = 2)$. By restricting the validity of Eq (2) it can be written as Eq (4), where the symbols are defined on p 180. It is now assumed that a certain operation

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E192/E382

The Correlation Methods of Investigating (Ionospheric) Fluctuations in the Presence of a Slowly-changing Component

Δ is applied to the function $\Sigma(t)$, such that:

$$\Delta\Sigma(t) = \Delta\Phi(t) + \Delta\varphi(t) ,$$

Provided the conditions of Eqs (8) and (9) are fulfilled, $\Delta\Sigma(t)$ can be expressed by Eq (10), which determines the so-called "glancing average" taken over an interval μ. The functions G and F in Eq (10) are the so-called glancing averages for Φ and φ, while $\Delta\Phi$ and $\Delta\varphi$ are the deviations of Φ and φ from the glancing averages. The correlation function for the transformed quantities $\Delta\varphi_i(t)$ is defined by Eq (11). This can be written as Eq (13) provided the notation defined by Eqs (12) is adopted. The expressions entering into Eq (13) are given by the integrals of Eqs (14) - (17). Consequently, Eq (13) can be written as Eq (18). It is seen that by applying the Δ-operation to $\varphi_i(t)$ the correlation given by Eq (18) differs from the function $\rho_{12}(\tau)$.

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The Correlation Methods of Investigating (Ionospheric) Fluctuations in the Presence of a Slowly-changing Component

The magnitude of the discrepancy between the correlation functions depends on the shape of $\rho_{12}(\tau)$ and on the choice of μ. The relative error in determining $\rho_{12}(\tau)$ from Eq (18) can be represented by Eq (19). Now the significant portions of the correlation function for the ionospheric irregularities can be approximated either by Eq (20) or by Eq (21). The meaning of τ_0 in these equations can be seen from Figure 3. By employing Eq (18) it is possible to investigate the error for the cases represented by Eqs (20) and (21). The relative error for the case represented by Eq (20) is illustrated in Figure 4, while the case of Eq (21) is shown in Figure 5. The shape of the functions ρ_Δ and τ for the cases represented by Eqs (20) and (21) are illustrated in Figures 6 and 7. If it is assumed that Φ (t) can be approximated by a portion of a sinusoid, it is found that in order to fulfil the conditions of Eqs (8) and (9), the

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The Correlation Methods of Investigating (Ionospheric) Fluctuations in the Presence of a Slowly-changing Component

parameter μ should obey the following expression:

$$\tau_{0.5} \ll \mu \ll T_{\Delta} .$$

From the investigation it is concluded that by employing the method of the "glancing averages" it is possible to eliminate the slow changes when investigating the statistical properties of the fluctuations. The method can be useful in the investigation of the fluctuations of ultrahigh-frequency signals and in the study of the drift of small-scale inhomogeneities. The slow changes can be eliminated provided:

$$\tau_{0.5} \ll \mu \ll T_{\Delta}$$

where $\tau_{0.5}$ is the correlation radius of the fluctuations and T_{Δ} is the average period of the slow

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E192/E382

The Correlation Methods of Investigating (Ionospheric) Fluctuations in the Presence of a Slowly-changing Component

fluctuations. In the typical case it is found that μ = 60 min. Consequently, the necessary condition is fulfilled since $\tau_{0.5}$ = 3 min and T_A = 12 to 24 hours.

There are 8 figures, 3 tables and 6 references, 5 of which are Soviet and 1 English.

ASSOCIATION: Moskovskiy gosuniversitet imeni M.V. Lomonosova (Moscow State University imeni M.V. Lomonosov)

SUBMITTED: March 17, 1959

Card 7/7

ACCESSION NR: AT3012750 S/2831/60/000/002/0019/0032

AUTHORS: Grishkevich, L. V.; Gusev, V. D.; Kushnerevskiy, Yu. V.; Mirkotan, S. F.; Porshkin, Ye. G.

TITLE: Results of investigations of ionospheric inhomogeneities and their motions, obtained at the Soviet stations during the IGY

SOURCE: AN SSSR. Mezhduvedomst. komit. po prov. Mezhdunar. in. geofizich. goda. 5 razdel program. MGG: Ionosfera. Sb. statey, no. 2, 1960, 19-32

TOPIC TAGS: ionosphere, ionospheric inhomogeneity, international geophysical year, upper atmosphere circulation, diurnal variation, seasonal variation, drift in the ionosphere, radio wave reflection, inhomogeneity lifetime

ABSTRACT: This is a preliminary report of systematic observations made in the Soviet Union as part of the International Geophysical

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ACCESSION NR: AT3012750

Year and aimed at investigating the circulation of the upper atmosphere, the diurnal and seasonal variations, the behavior of ionospheric-wind velocity, latitudinal and longitudinal effects, and the connection of various geophysical phenomena with drift in the ionosphere. The stations at which the motions in the ionosphere were investigated are listed and the measurement equipment and procedures briefly described. Data are presented on the magnitude and direction of the drift velocity in the E and F2 layers; the anisotropy of the form of the inhomogeneities in the F2 layers and the statistical properties of the inhomogeneous structure of the ionosphere, as described by the behavior of the turbidity coefficient; the angular spectrum and angles of arrivals of the reflected radio waves; random drift of the ionosphere and the lifetime of the inhomogeneities; the amplitude distribution; and period fluctuations. The authors state that although the presence of latitudinal or longitudinal regularities in the parameters investigated cannot be deduced as yet, it is obvious that the variations of the small-

ACCESSION NR: AT3012750

scale inhomogeneities are of local character. Comparison of ionosphere drift investigations made by different methods indicates that both large and small scale inhomogeneities participate in the general circulation of the ionosphere, their different behaviors are probably due to different origin, and a common cause controls their motion. The preliminary results indicate good agreement between the data obtained in the Soviet Union and abroad. It is urged that the obtained data be reduced in a more precise fashion than afforded by similarity methods, using correlation analysis and electronic computers. The article is an abbreviation of a paper based on work performed by N. M. Yerofeyev and V. P. Perely'gin (Ashkhabad), L. V. Grishkevich and N. A. Mityakov (NIRFI, Gorkiy), Yu. V. Kushnerevskiy and Ye. S. Zayarnaya (IZMIRAN, Moscow), V. D. Gusev, L. A. Drachev, S. F. Mirkotan, Yu. V. Berezin, M. P. Kiyanovskiy (Moscow, MGU), V. E. Zelenkov and V. N. Checha (Tomsk, SFTI); B. L. Kashcheyev, Ye. G. Proshkin, V. V. Tolstov, and N. T. Tsimbal (Kharkov, KhPI) and V. Kokurin (Simenz). Orig. art. has: 11 figures,

ACCESSION NR: AT3012750

3 tables, and 2 formulas.

ASSOCIATION: None

SUBMITTED: 00 DATE ACQ: 22Oct63 ENCL: 00

SUB CODE: AS, AI NO REF SOV: 013 OTHER: 007

Card 4/4

S/169/61/000/005/047/049
A005/A130

9.9110

AUTHORS: Gusev, V.D., Mirkotan, S.F.

TITLE: On some anomalies incident to investigation of ionospheric drifts

PERIODICAL: Referativnyy zhurnal, Geofizika, no. 5, 1961, 31, abstract 5 G 257. (V sb.: Issled. ionosfery. No.3, Moscow, AN SSSR, 1960, 77-82 (English summary))

TEXT: Investigations of large-scale inhomogeneities (Moscow, MGU) for the period 1957-1958 revealed the presence of imaginary velocities of chaotic variability, deviations of the fronts of the apparent velocities from linear deviation and the existence of various autocorrelative functions for recordings in three spaced points. These anomalies depend on the time of day and attain a maximum during daylight, which indicates a connection between the appearance and motions of the inhomogeneities and the intensity of solar radiation. The anomalies cannot be explained by insufficiency of the sampling volume because the latter is about twice as

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On some anomalies incident to investigation ... S/169/61/000/005/04?/0??
A005/A130

great in the daytime as at night. The existence of anomalies points up the necessity of checking more carefully the conditions of applicability of the total correlation analysis method to investigation of the ionosphere's inhomogeneous structure, and the necessity of selecting optimum dimensions for the measuring triangle and its orientation. There are no references.

Yu. Kushnerevski,

[Abstractor's note: Complete translation.]

Card 2/2

31761
S/058/61/000/011/023/025
A058/A101

9.9100

AUTHORS: Gusev, V. D., Mirkotan, S. F.

TITLE: Correlation analysis applied to media with volume characteristics

PERIODICAL: Referativnyy zhurnal, Fizika, no. 11, 1961, 312, abstract 11Zh423 (V sb. "Issled. neodnorodnostey v ionosfere. no. 4". Moscow, AN SSSR, 1960, 7-19, English summary)

TEXT: A generalized correlation analysis is given for media whose properties change randomly in the direction of three space coordinates and in time. The statistics are stationary in time and homogeneous in space. There is indicated the general method of determination of the average spatial characteristics of the inhomogeneities of such media: anisotropy of shape and of average size of inhomogeneities, orientation of the major axes of anisotropy, drift velocity V_d, rate V_c of the chaotic variability of the inhomogeneities, and some other parameters. It is shown that the correlation analysis of 3-point measurements of ionospheric inhomogeneities that is used at present (the so-called space-spaced reception) is invalid in the general case of arbitrary orientation of anisotropy axes and presence of a vertical component of drift

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S/058/61/000/011/023/025
A058/A101

Correlation analysis applied ...

velocity V_{dz}. In this case, for example, rate V_c obtained from 3-point measurements is excessive as compared with the true rate owing to the presence of V_d. Incident to 3-point measurements it is natural to determine only the horizontal cross-section of the average shape of inhomogeneities in space.

[Abstracter's note: Complete translation]

Card 2/2

9.9100

S/169/61/000/006/037/039
A005/A130

AUTHORS: Mirkotan, S.F., Kushnerevskiy, Yu.V., Gusev, V.D.

TITLE: The motions of inhomogeneities of different sizes in the ionosphere

PERIODICAL: Referativnyy zhurnal, Geofizika, no. 6, 1961, 30, abstract 6G244. (V sb.: Issled. neodnorodnostey v ionosfere. No. 4, Moscow, AN SSSR, 1960, 57-69 (English summary))

TEXT: The similarity of anisotropy in shape of large- and small-scale inhomogeneities points to an influence of the earth's magnetic field on inhomogeneities. The identity in behavior of some parameters characterizing the inhomogeneities, the general trend of the variation of the direction of motion and a number of other factors indicate the existence of general principles affecting the behavior of both types of inhomogeneity. However, the relation between variation in size and the lifetime of these sizes, which is opposite for large and small inhomogeneities, and the opposite direction of the latitude component of the drift rate point

B

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S/169/61/000/006/037/039
The motions of inhomogeneities of different ... A005/A130

to different origins for these inhomogeneities. The essential role of diffusive and chaotic processes is noted, especially for small-scale inhomogeneities.

B

Authors' summary

[Abstractor's note: Complete translation.]

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GAYLIT, T.A., GUSEV, V.D.

Electronic correlator for ionospheric measurements.
Mezhdunar. geofiz. god no.8:42-46 '60. (MIRA 13:6)
(Ionospheric research)
(Electronic apparatus and appliances)

9.9000, 9.9100

77768
SOV/109-5-2-1/26

AUTHOR: Gusev, V. D.

TITLE: Statistical Properties of Large Inhomogeneities in the Ionosphere

PERIODICAL: Radiotekhnika i elektronika, 1960, Vol 5, Nr 2, pp 179-187 (USSR)

ABSTRACT: The statistical and correlation properties of the wave phase after reflection by the ionosphere with large inhomogeneities are investigated. The analysis is based on the solution of the eikonal equation. The distribution of phase change velocity with time is independent of the distance to the ionosphere only for normal distribution of wave incidence angles. The statistical character of the phenomena of focusing by large inhomogeneities in the ionosphere was analyzed. This may have considerable significance for the phase method of analysis of these inhomogeneities.

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Introduction. Experimental investigations of radio

Statistical Properties of Large Inhomogeneities in the Ionosphere

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wave propagation reflected by the ionosphere did discover variations of these waves in time and space, due to widely varying inhomogeneities in the ionosphere. Least investigated are the so-called large inhomogeneities stretching for tens or hundreds of kilometers, of different lengths. In particular, one of the factors in very long distance wave propagation is the existence of great inhomogeneities. Experimental investigations of reflected waves of different frequencies prove that the mean properties of waves reflected from different ionosphere layers do not show any remarkable dependence on frequency. The field changes are basically due to variations of the refraction, and theoretically the wave propagation in the actual ionosphere is equivalent to a reflection from a series of convex and concave mirrc which alternately focus and defocus the wave fields. The statistical method of analysis is most acceptable. (1) Common Properties of the Eikonal. The Fresnel

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zone radius for reflected short radio waves with normal incidence is approximately 3-4 km. The general analysis of geometrical optics equations:

$$(\operatorname{grad}\varphi)^2 = 1,$$
$$\operatorname{grad}\ln A\operatorname{grad}\varphi = -\frac{1}{2}\Delta\varphi,$$

(where φ is eikonal; A, wave amplitude) shows that the first equation (of the eikonal) is basic. Thus, the starting point of investigations will be:

$$\left(\frac{\partial\varphi}{\partial x}\right)^2 + \left(\frac{\partial\varphi}{\partial y}\right)^2 + \left(\frac{\partial\varphi}{\partial z}\right)^2 = 1 \qquad (1)$$

with boundary condition $\varphi(x, y, z) = 0 = f(x, y)$ for $z = 0$, where the plane $z = 0$ corresponds to bottom of the reflecting ionosphere layer, and axis z is directed from the ionosphere to the earth. Taking for simplicity $z = f(x)$, the eikonal equation solution is:

$$\varphi = f(u) + \sqrt{z^2 + (x-u)^2}, \qquad (2)$$

where u is given by:

$$x - u = \frac{z\frac{df(u)}{du}}{\sqrt{1-\left(\frac{df(u)}{du}\right)^2}}. \qquad (3)$$

which solution is real, if:

$$\left|\frac{df(u)}{du}\right|_{max} < 1. \qquad (4)$$

The geometric solution of (3) corresponds to finding the coordinates of the intersection of curves:

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$$v_1 = x - u, \quad v_2 = z \frac{df(u)}{du} \Big/ \sqrt{1 - \left(\frac{df(u)}{du}\right)}.$$

The condition for uniqueness of this solution and also of (2) can be stated as:

$$z \left| \frac{d^2 f(u)}{du^2} \right|_{max} = \varkappa_0 < \left[1 - \left(\frac{df(u)}{du} \right)^2_{max} \right]^{1/2}. \quad (5)$$

where for small angles, i.e., $\left|\frac{df}{du}\right|_{max} \ll \left|\quad \varkappa_0 \right| < .$

Since existence of several possible solutions of (2) corresponds to the arrival of several rays, i.e., presence of a focus, $\varkappa_0$ is called parameter of focusing. For the irregular distribution of large inhomogeneities, the condition (4) takes on a

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probability type expression:

$$\gamma \sigma_{f'} \ll 1. \tag{7}$$

and, analogously, (5) is rewritten as:

$$z \left| \frac{d^2 f(u)}{du^2} \right|_{max} = \gamma_1 \sigma_{f''} = \gamma \varkappa_0 \ll [1 - (\gamma \sigma_{f'})^2]^{3/2}. \tag{8}$$

For the usual small scatter angles, i.e., for $\sigma_{f'} \ll 1$, Eq (8) takes shape of $\kappa_0 < 1/\gamma$, which means that the solution of the eikonal equation will be unique with the probability $p(\gamma)$, that is in absence of foci. (2) Statistical Properties of the Eikonal. For statistically homogeneous processes, the condition:

$$\widetilde{F(\psi)} = \overline{F(\psi)}, \tag{9}$$

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must be satisfied, where

$$\overline{F(\psi)} = \int_{-\infty}^{\infty} F(\psi) W(\psi) d\psi, \quad \widetilde{F(\psi)} = \lim_{x_0 \to \infty} \frac{1}{2x_0} \int_{-x_0}^{x_0} F[\psi(x)] dx,$$

and F is an arbitrary integrable function. The density of probability is designated by W and characteristic function by Θ. Assuming f = f(u, t) and considering (3), it follows from (2) that:

$$\frac{\partial\varphi}{\partial x} = \frac{\partial f(u,t)}{\partial u}, \quad \frac{d\varphi}{dt} = \frac{df(u,t)}{dt}. \tag{10}$$

where u is a solution of (3). In accordance with (9) and (10) the characteristic functions $\Theta(\eta_1)$ for $\partial\varphi/\partial x$ and $\Theta(\eta_2)$ for $d\varphi/dt$ equal: On the $z \neq 0$ level:

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$$\Theta_0(\eta_1) = \lim_{u_0 \to \infty} \frac{1}{2u_0} \int_{-u_0}^{u_0} \exp\left(i\eta_1 \frac{\partial f}{\partial u}\right) du,$$

$$\Theta_0(\eta_2) = \lim_{u_0 \to \infty} \frac{1}{2u_0} \int_{-u_0}^{u_0} \exp\left(i\eta_2 \frac{df}{dt}\right) du,$$

and for level z:

$$\Theta(\eta_1) = \lim_{x_0 \to \infty} \frac{1}{2x_0} \int_{-x_0}^{x_0} \exp\left(i\eta_1 \frac{\partial f}{\partial u}\right) dx = \lim_{u_0 \to \infty} \frac{1}{2u_0} \int_{-u_0}^{u_0} \exp\left(i\eta_1 \frac{\partial f}{\partial u}\right) \frac{dx}{du}\, du,$$

$$\Theta(\eta_2) = \lim_{x_0 \to \infty} \frac{1}{2x_0} \int_{-x_0}^{x_0} \exp\left(i\eta_2 \frac{df}{dt}\right) dx = \lim_{u_0 \to \infty} \frac{1}{2u_0} \int_{-u_0}^{u_0} \exp\left(i\eta_2 \frac{df}{dt}\right) \frac{dx}{du}\, du, \qquad (11)$$

where dx/du with reference to (3) is expressed through u for $\sigma_f' \ll$:

$$\frac{dx}{du} = 1 + z \frac{\partial^2 f}{\partial u^2} \qquad (12)$$

and integration is made per all values of u corresponding to (7), (8), whereby $dx/du > 0$ per (8) and (12). For the general conditions $\Theta_0(\eta_1) = \Theta(\eta_1)$, but

$$\Theta_0(\eta_2) \neq \Theta(\eta_2) = \Theta_0(\eta_2) + z \lim_{u_0 \to \infty} \frac{1}{2u_0} \int_{-u_0}^{u_0} \frac{\partial^2 f}{\partial u^2} \exp\left(i\eta_2 \frac{df}{dt}\right) du.$$

Only for normal distribution of $W(\frac{df}{dt})$ and $W(\frac{\partial^2 f}{\partial u^2})$, $\Theta_0(\eta_2) = \Theta(\eta_2)$. The correlation coefficient for these functions R = 0 for the limit conditions of (12). Thus, the probability density is independent of z in two cases (1) for $\partial\varphi/\partial x$ at arbitrary $W(\partial\varphi/\partial x)$; (2) for $d\varphi/dt$ under normal distribution of $W(d\varphi/dt, \partial\varphi/\partial x)$. (3) Correlation Properties of the Eikonal. The correlation radius for function $\psi(x)$ is:

$$r = \sqrt{\frac{\sigma_\psi^2}{\left(\frac{d\psi}{dx}\right)^2}}. \qquad (13)$$

for a normal distribution:

$$W(y_1, y_2) = \frac{1}{2\pi\sqrt{1-R^2}} \exp\left[-\frac{1}{2(1-R^2)}(y_1^2 + y_2^2 - 2Ry_1 y_2)\right],$$

where R is correlation coefficient between y_1 and y_2. From (9), (10), (11), (12), are derived the equations:

$$\overline{\left(\frac{\partial^2\varphi}{\partial x^2}\right)^2} = \frac{\sigma_1^2}{\varkappa_0^2}(y_1 - y_2), \quad \overline{\left(\frac{\partial^2\varphi}{\partial x\, dt}\right)^2} = \frac{\sigma_2^2}{\varkappa_0^2}[R^2(y_1 - y_2) + \varkappa_0^2(1 - R^2)y_1]. \qquad (14)$$

$$y_1 = \frac{1}{\sqrt{2\pi}} \int_{-\gamma}^{\gamma} \frac{dy}{1 + \varkappa_0 y} \exp\left(-\frac{y^2}{2}\right); \quad y_2 = \frac{1}{\sqrt{2\pi}} \int_{-\gamma}^{\gamma} \exp\left(-\frac{y^2}{2}\right) dy = \Phi(\gamma). \quad (15)$$

$$y_1 \leqslant \frac{\Phi\left[\gamma \sqrt{1 + \frac{2}{\gamma^2} \ln(1 - \gamma^2 \varkappa_0^2)}\right]}{\sqrt{1 + \frac{2}{\gamma^2} \ln(1 - \gamma^2 \varkappa_0^2)}}. \quad (16)$$

From (13), (14), (15), (16), it follows that:

$$r_1 = \frac{r_{01} \varkappa_0}{\sqrt{y_1 - y_2}} = g_0 r_{01}$$

for variations of angle of incidence $\partial \varphi / \partial x$, and:

$$r_2 = \frac{r_{02} \varkappa_0}{\sqrt{R^2 (y_1 - y_2) + (1 - R^2) \varkappa_0^2 y_1}}$$

for variations $d\varphi/dt$. The greatest effect will be for $R = 1$, or:

$$r_2 \leqslant \frac{r_{02}\kappa_0}{\sqrt{y_1 - y_2}} = g_0 r_{02}$$

The term $g_0 = \kappa_0 / \sqrt{y_1 - y_2}$ can be called focusing factor and changes from unity at $\kappa_0 = 0$ to small values for $\kappa_0 \gamma \longrightarrow 1$. Thus, using only the method of registering variations of the reflected wave eikonal, the measured values agree completely with those at the exit of the wave from the ionosphere. Other methods of large nonhomogeneities registration always lead to focusing. The focusing factor g_0 determines the reduction of the measured dimensions. From (13) and (8):

$$\kappa_0 = 2\sigma_{f'} = \frac{2\sigma_{\varphi'}}{r_0},$$

since $\sigma_{f'} = \sigma_{\varphi'}$. For the above conditions of measuring, $\kappa = \frac{z}{r}\sigma_{\varphi'}$ and $g(\kappa)$. Since $r < r_0$, $\kappa > \kappa_0$ and $g > g_0$, and from the magnitude of g one can judge the importance or unimportance of the focusing effects. For $g \sim 1$, the focusing effect is insignificant, and $r \sim r_0$. The results are correct for $\sigma_{\varphi'} \ll 1$, $2\kappa_0 < 1$ and normal distribution law $W(\partial f/\partial u)$, $W(df/dt)$. In cases when condition $2\kappa_0 < 1$ is not obeyed, the phase of the wave propagated in free space should be investigated, taking diffraction effects in the focus area into consideration. Conclusion: Results of previous investigations of

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large inhomogeneities of the F_2 ionosphere layer, made by others by the registration method of variations $d\varphi/dt$ and φ, did show that $d\varphi/dt$ follows a normal distribution law. Then due to the independence of the time variables $(\partial\varphi/\partial t)$ from the space variables $(\partial\varphi/\partial x)$, it follows that these have a normal distribution, too, because $\frac{d\varphi}{dt} = \frac{\partial\varphi}{\partial x} v_d + \frac{\partial\varphi}{\partial t}$, where v_d is drift velocity. It was found that $\sigma_\varphi \ll 1$. In agreement with (10), $\partial f/\partial u$ and df/dt have a normal distribution, which applies also to $\partial^2 f/\partial u^2$. An example is calculated for two values of the height of the reflecting layer F_2: z = 300 km and z = 250 km ($\kappa_0 = \frac{4z}{\Delta}\sigma_\varphi$, because $\Delta = 4 r_0$). For directions along the major axes of characteristic ellipses $g_0 >$ 0.99. On the average, the focusing is not too important during day or night. In the mornings or evenings the dimensions of large inhomogeneities can be distorted

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up to 20%, sometimes even more, depending on the height of the bottom of the reflecting layer. For anistropic inhomogeneities the focusing can lead to an increase of anisotropy radio waves scattered in the ionosphere. There are 9 references, 6 Soviet, 3 U.K. The U.K. references are: A. Hewish, Proc. Roy. Soc., 1952, 214, 494; E. N. Bramley, Proc. Roy. Soc., 1953, 220, 1140; C. N. Munro, Proc. Roy. Soc., 1958, 63, 217.

ASSOCIATION: Moscow Government University imeni M. V. Lomonosov, School of Physics (Moskovskiy gosudarstvennyy universitet imeni M. V. Lomonosova, Fizicheskiy fakul'tet)

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D201/D305

9.9100

AUTHOR: Gusev, V.D., Vinogradova, M.B. and Gaylit, T.A.

TITLE: Statistical properties of phase of a wave reflected from the ionosphere

PERIODICAL: Referativnyy zhurnal. Avtomatika i radioelektronika, no. 7, 1961, 26, abstract 7 I168 (V sb. 100 let so dnya rozhd. A.S. Popova, M., AN SSSR, 1960, 220-227)

TEXT: The possibility is analyzed of determining the laws of distribution of continuous random processes from one experimental recording. The laws are determined of distribution of the irregular part of the phase related to the ionosphere in homogeneities of a wave. 8 references. [Abstracter's note: Complete translation]

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MIGULIN, V.V.; LOPUKHIN, V.M.; GUSEV, V.D.

Fourth All-Union Conference of the Ministry of Higher and Secondary Specialized Education of the U.S.S.R. on Radio Electronics. Vest. Mosk. un. Ser. 3: 82-84 Ja-F '61. (MIRA 14:4)
(Radio—Congresses)

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B117/B102

9.9100

AUTHORS: Gusev, V. D., Berezin, Yu. V.

TITLE: Radio-wave absorption measurements in the presence of large inhomogeneities in the ionosphere

PERIODICAL: Moskovskiy Universitet. Vestnik. Seriya III: Fizika, Astronomiya, no. 5, 1961, 39-47

TEXT: The effect of large ionospheric inhomogeneities on the amplitude and phase of reflected radio waves and, thus, on the measured reflection factor R was investigated. A method to reduce this effect was studied. The investigations were based on some experimental data obtained by investigating the F_2 layer. It was shown that the amplitudes of reflected signals may be focused. The focusing effects are to be taken into account to avoid errors in measuring the reflection factor. A study of the behavior of the phase $\varphi(x,y,t)$ of the reflected signal showed that φ and $f_0(u,v,t)$ were random functions. Therefore, statistical analysis and averaging of the measured values of the reflection factor are necessary. When R is determined from results obtained by measuring the amplitudes of

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once and twice reflected signals, an averaging of $2A_2(t)/A_1(t)$ will be useful. The observation time T varies with the parameters of the inhomogeneities in the layer. Therefore, it should be chosen considering the following demands: 1. T must be as short as possible to avoid distortion of the function R(t) due to averaging. 2. T must be as long as possible to minimize the effect of the random function $f''_0(t)$ on the measurements. In spite of the discrepancy of these demands, a compromise value of T can be found as the function R(t) changes more slowly than f''_0. The demands can be expressed as follows:

$$1.\quad 1/T \int_{t_0 - T/2}^{t_0 + T/2} |r(t)|\,dt \ll R(t_0)$$

$$2.\quad |\alpha z_0 \sigma_0| \ll R(t_0),$$ where α is the probability factor determining the "confidential" range; σ_0 is the standard of the mean value. With numerical estimations these demands can be written as

1) $T^2 \ll 24/B\Omega^2$ (9) and 2) $T^{1/2} \gg (2\tau_{00})^{1/2}\alpha z_0 \sigma_{f''_0}$ (10), where

$\sigma^2_{f''_0} = \sigma^2_{f'_0} \left| \varrho''_{f'_0}(0) \right|$, $\left|\varrho''_{f'_0}(0)\right| \sim 1/\Delta^2$, $\tau_{00} \ll \tau_0$; Δ - horizontal dimension of large inhomogeneities, τ_0 - radius of correlation of the process $f'_0(t)$, τ_{00} - radius of correlation of the process $f''_0(t)$, $\varrho_{f'_0}$ - correlation factor, $\sigma^2_{f''_0}$ - dispersion, $\Omega = 2\pi/T_0$, $T_0 = 24$ hr. For practical application of the results obtained it is necessary to collect experimental data on various ionosphere layers during various seasons and hours. The observation time T has to be taken as short as possible. To measure the reflection factor for the reflection from the F_2 layer, T must be of the order of about 1 hr. Continuous information on the regular change of the reflection factors can be achieved by sliding averaging. (Ref. 9: V. S. Pugachev. Teoriya sluchaynykh funktsiy i yeye primineniye k zadacham avtomaticheskogo upravleniya. (Theory of random functions and its application to problems of automatic control), Fizmatgiz, 1960). There are 2 figures and 9 references: 7 Soviet and 2 non-Soviet.

ASSOCIATION: Kafedra rasprostraneniya radiovoln (Radio-Wave Propagation Department)

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AUTHORS: Gusev, V.D., and Li Chun

TITLE: The relation between the inhomogeneity parameters of the ionosphere and ionospheric disturbances

PERIODICAL: Referativnyy zhurnal. Geofizika, no. 4, 1962, 34-35 abstract 4G197 (Scientia sinica, 1961, 10, no. 2, 225-230)

TEXT: The authors studied theoretically the relation between the degree of disturbance (β) and the inhomogeneity parameters of the ionosphere. The parameters were found by correlation analysis of the changes in radiowaves that had been diffracted by the ionosphere. It is shown that practical methods exist only for β = 0 (although in general β ≫ 1), and also that the drift velocity of inhomogeneities, the velocity of random motion, the anisotropy factor, and the ansiotropy axis are independent of β. β only affects the mean duration and scale of the inhomogeneities. A method is given that enables experimental results to be converted to the general case β = 0, so that the real spectrum of spatial inhomogeneities,
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